July 26, but nothing more than could, under the conditions of weather, be expected.

I cannot find out anything about other steamers meeting an exceptionally big wave.

Abstract of Log, s.s. "Umbria."

Date.	Wind.	Bar.	Air.	Water.	Remarks.
July 25.					
Noon	S.W.	29·60	62°	63°	Strong wind and overcast.
4 p.m.	W.S.W.	29·50	60	61	Fresh wind and showery.
8 p.m.	W. by N.	29·45	60	61	Fresh wind and clear.
Midnight	W. by N.	29·31	60	62	Moderate gale, force 9.
26th.					
4 a.m.	N.W. by W.	29·42	59	61	Moderate gale and squally, force 9.
8 a.m.	N.W. by W.	29·50	60	62	
Noon	N.W. by W.	29·70	59	62	

"4.40 a.m. Sea came on board over the bows, breaking No. 2 companion hatch, twisting the forward bridge, breaking some iron stanchions on the bridge, breaking the short bridge between the forward end of the promenade deck and the break of the forecastle, and bending the brass rails on the port side of the main upper bridge, leaving the lower bridge intact. 8 a.m. Fresh gale, force 9, with a heavy, confused sea. Noon. Gale moderating and the sea going down, but still confused."

So much from the log-book; but the following particulars are from the chief officer's report, and the statement of the second officer, who was in charge at the time the sea came on board.

At midnight on the 25th the wind was freshening from west by north, and the weather becoming squally. A long, heavy sea was coming from west-south-west, but the ship was only taking an occasional spray over all. At 2 a.m., 26th, the wind was west-north-west, a gale, with heavy and frequent squalls, sea rising fast from north-west. At 4, the wind had veered to north-west, with heavy and frequent squalls. At this time the west-south-west sea was still very heavy, with a high north-west sea running across and over it, making a very high and confused sea; but the ship was making 16 knots, and though the spray was flying fore and aft, she had not up to this time taken a drop of solid water on board.

At 4.40 a.m., lat. 50° 50′ N., long. 27° 8′ W., the officer of the watch noticed a heavy-breaking sea coming from the north-west; he ordered the officer at the engine telegraphs to reduce to "half speed," but before this could be done the top of this sea came on board, but did no damage. The ship rose quickly to it, but as this wave passed under the stern she plunged heavily, and dipping her bows into the second wave—not breaking, or as the officer of the watch expresses it, "dead water,"—scooped up a mass of water which, running aft over the break of the forecastle, fell upon No. 2 companion hatch, breaking it to pieces, also breaking the short bridge between the fore-end of the promenade deck and the break of the forecastle. The look-out bridge between the lighthouses was twisted, and five iron stanchions and 20 feet of the iron rails on it broken, and four brass stanchions on the port side of the upper main bridge were bent; the middle part of the topgallant forecastle deck for 40 feet in a fore-and-aft line, was sent down 2 inches by the weight of water passing over it. Some water got down No. 2 hatchway and frightened a few passengers.

The second officer is certain that the first sea did no damage, as only the top of it broke over the ship, but he describes the plunge the ship took, as this wave passed astern, as very heavy, and that she went bows into the solid water of the second wave, which he is quite certain was not breaking, but "coming smoothly along." This made the ship "stagger, and the sensation was as if she had struck something hard." After the sea came on board the speed was reduced to 10 knots, and was not increased till noon.

The canvas screen on the port side of the upper main bridge was spread, and the spray striking this bent the brass stanchions. The lower bridge escaped, through there being no canvas screen spread.

Although the wind was three points on the starboard bow, with a heavy sea from the same direction, it seems to me, from the brass stanchions on the upper main bridge having been bent aft and to starboard, and from certain marks on the forecastle deck, that the second officer's statement, as to the damage being done by the second wave (in my opinion the west-south-west sea, which was still running high and fast), is correct; and in my own experience I have seen, on more than one occasion, serious damage done by a sea coming up on the lee bow and breaking on board hours after the wind had been blowing three or four points on the other bow.

If we take into consideration a long and heavy sea from west-south-west, a north-west gale, and heavy sea from the same quarter, we shall have an ugly, confused sea. If a very powerful ship with very fine lines is driven at the rate of 16 knots through this confused sea, I do not think there is the least occasion to call in the aid of tidal or earthquake waves to account for any damage the ship would receive.

In the engine-room there was no shock felt, and the sailors and firemen say they did not notice anything unusual save only some passengers making a noise.

The masthead light was extinguished through the chimney being unshipped and falling across the wick.

Yours very truly,
W. WATSON.

Huskisson Dock, Liverpool, August 18.

THE GARDEN ROSES OF INDIA.

THE principal garden roses cultivated in Europe and in India may be traced to Western Asia and China. The old-fashioned summer roses, which were the ornament of gardens in Europe forty to fifty years ago, are mostly referred to *Rosa gallica*, which has its home in South Europe and Western Asia, and to *Rosa centifolia* and *damascena*, which probably came from the mountains of Armenia and Northern Persia. All these are distinguished by the incomparable delicacy of their aroma, and of the two last-named kinds one or the other is cultivated on a large scale in Southern France, Italy, Macedonia, Asia Minor, Persia, and Northern India, for rose-water and essence of roses (attar). The flowering season of these kinds is short, lasting a few weeks only, and it was an important event for horticulture when, towards the close of last century, the China roses were introduced in Europe. The most important of these was *Rosa indica*, thus called by Linnæus because it was brought from India, where it has long been grown in gardens. Its home, however, is not India, but China, and its great value consists in this, that it flowers throughout summer and autumn, hence the name autumnal rose, also monthly rose (*Monatsrose*). For this reason a variety was called *Rosa semperflorens*. Another variety, described under the name of *Rosa fragrans*, distinguished by its strong though not always very delicate scent, became the parent of the tea-roses. By crossing these kinds and other species with the old garden roses, the numberless varieties of hybrid perpetuals and tea-roses have been obtained, which now ornament our gardens in Europe as well as in India.

In India nine or ten species of roses are indigenous, but with the exception of *Rosa moschata*, a magnificent

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climber of wide distribution, none have contributed to the production of garden roses. All have their local names in the language of the district where they grow, but—and this is a most remarkable fact—the rose has no name in Sanskrit. In some dictionaries *Java* is rendered as *Rose*, but this is an altogether different shrub, *Hibiscus Rosa-sinensis*, the well-known shoe-flower (used for blacking shoes) of Indian gardens, believed to be indigenous in China, and possibly also indigenous in tropical Africa.

As far as known at present, the roses of Western Asia have no Sanskrit name, and were not known in ancient India. Yet *Rosa damascena* is extensively grown on a large scale for the manufacture of rose-water and essence of roses, throughout Northern India, as far as Ghazipur, in 25° N. lat. Hermann Schlagintweit was, I believe, the first to draw attention to this remarkable fact. It is not impossible that the western roses were introduced into India by the Mohammedans. As there is no Sanskrit word, so is there no original term for the rose in Hindi. In most Indian languages the cultivated rose is called *gúl*, which is the Persian name. It is also called *gúláb*, which really means rose-water, unless, indeed, as sometimes stated by Munshis in India, *áb* in this case is a suffix with no separate meaning. In addition to their local names, some of the wild roses of the Himalayas are often called *gúláb*, *bán gúláb* (the rose of the forest, or wild rose).

Besides *Rosa indica*, several other Chinese species are cultivated in India. The origin of one of the Indian garden roses, however, is doubtful: this is *Rosa glandulifera*, well described by Roxburgh in his "Flora Indica." It is a white subscandent cluster rose, which has erroneously been referred to *Rosa alba*. In Hindi and Bengali it is called Seoti, Sivati, Shevati. According to Piddington ("English Index to the Plants of India," 1832), this rose has a Sanskrit name, Sevati, pointing to *shveta* (white). This, however, requires verification. Roxburgh believed its origin to be China.

D. BRANDIS.

THE IRON AND STEEL INSTITUTE.

THE autumn meeting of this Institute was held at Owens College, Manchester, from the 14th to the 17th inst. The address of the President was of a two-fold character, having reference to the metallurgy of steel and to the question of trade. As regarded mild and hard steel, the success that had attended the application of the former was due, in the President's opinion, to the greater ease in its manufacture as compared with hard steels, in which the alloying compounds vary in specific gravity, melting-point or fusibility, and specific heat. Another feature in favour of the manufacture of mild steel is that not more than one-tenth per cent. of the combined elements—sulphur, phosphorus, and silicon—is admissible. As regards working, although the steam-hammer was requisite to force cinder out of puddled iron, with steel such violence is not required, and must be abandoned in favour of the quiet concentrated force of the forging press.

In his reference to trade, and especially the iron and steel trade, Mr. Adamson gave it as his opinion that, so long as we tax ourselves for the benefit of a foreign producer, and pay all the cost incident to the carrying on of our country, and enable the merchant to import manufactured goods from abroad (which bear no portion of the taxation of the country) at a greater profit than he could realize by purchasing at home, so long will our great trade remain depressed and our foreign competitor rejoice at our want of foresight. He also drew attention to the circumstance that the manufacture of goods at home employed not only the hands directly engaged in the industry, but gave work also to cognate industries.

The first paper read was on "Metallurgical and Mechanical Progress as illustrated at the Manchester Exhibition." The object of the paper was to point out to the visitor what was to be seen at the Exhibition; the paper was not discussed.

The paper of Sir Lowthian Bell, on "The Reduction of Ores of Iron in the Blast Furnace," was next read, and gave rise to a very lengthy discussion. The author first explained the general functions of the blast furnace, in which the ores are reduced in the uppermost zone, heated and chemically acted upon in the intermediate region, and melted in the lowest portion. In the reducing zone the ore and limestone are first heated only, but at about 400° F. the oxide of iron begins to lose oxygen; this is found in the gases, together with the carbon and oxygen contained in the carbonic acid of the limestone which is separated at a temperature of about 1500° F. A table was given, indicating generally the increased energy of carbonic oxide as a reducing agent, with increase of temperature, its influence being affected by variations in the ore. The paper is mainly of technical interest.

The next paper read was on "The Basic Open-hearth Process." The subject was treated under the three headings of plant, process, and produce. The furnace described is a modified form of the Siemens furnace, and it is necessary that, a basic-lined hearth having been obtained, a basic slag should be maintained in working.

The last paper read and discussed was on "Electric Lighting in Works and Factories," by Prof. J. A. Fleming. Several interesting points were brought forward. Thus, a table was exhibited comparing a 1200-light dynamo as manufactured in 1882 and 1887. The weight alone of the dynamo of the former machine was 44,820 pounds; that of the armature, 9800 pounds. It occupied 320 cubic feet. With a terminal electromotive force of 108 volts, and an output of 790 amperes, the total horse-power applied to rotate the armature was 154·8, the commercial efficiency was 67 per cent., whilst the price per 1000 watts output was £24. In the 1887 machine the weight is 11,760 pounds; that of the armature alone, 1568 pounds; the cubic space occupied is about 180 cubic feet. The terminal electromotive force is 105 volts, the current 720 amperes, the external electric activity 75,600 watts, and the power required on the pulley about 112 horse-power, the commercial efficiency being over 90 per cent., and the price 6*l.* per 1000 watts output. Statistics from the United States and France show that 117,201 lamps are used in the former country, and 55,321 in the latter; the great majority employed in each case are for workshops and factories. This is a very much larger extension of electric lighting than has taken place in this country. The author recommends, where possible, driving each dynamo from a separate steam-engine, controlled by a good governor, and having all the wiring and fittings carefully tested. In the matter of incandescence lamps attention is drawn to the importance of keeping the electromotive force within a volt of that marked upon the lamps; in this way the length of the life of the lamps is much increased. In the use of naked arc-lights the illumination rapidly falls off as we get away from the light. To obviate this, Mr. A. S. Trotter introduced his dioptric shades. The light is surrounded with a glass shade so cut or grooved into prismatic furrows that whilst causing only a small actual absorption, it will yet refract the rays of light in such a manner as to take away the light from directly under the lamp and increase the illumination at the remote districts. In conclusion, the author makes the statement that, as regards mills, works, and factories, the more closely its advantages and merits are inquired into, the more forcible they will seem, even in face of the fact that gas in the United Kingdom has a lower average price than in any other part of the world.

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